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MR 106

Factors Influencing the Mineral Economy of Canada — Past, Present and Future

by W. Keith Buck

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DE..ARTMENT OF ENERGY, MINES AND RESOURCES
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by W. Keith Buck

MINERAL RESOURCES BRANCH
DEPARTMENT OF ENERGY, MINES AND RESOURCES
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ABSTRACT

During the past 20 years, the value of mineral production has grown from 5.8 percent of GNP to 7.1 percent of GNP, and now amounts to nearly $5 billion annually, of which 50 percent originates in the metallic sector, 29 percent in the fuels sector and 21 percent in the industrial minerals sector of the industry. Minerals and mineral products account for about one third of the country's total export trade, 43 percent of all revenue freight traffic and more than 12 percent of total annual capital investment. Mineral development has been in large part responsible for the development of that vast part of Canada which lies above the populated area just north of the Canada-United States border.

The role of government in Canada has been to provide the legislative and taxation environment necessary to attract capital from domestic and foreign sources, and for the attainment of orderly and continuous mineral industry growth. The role of private industry in Canada has been to supply the knowledge and capital to explore, develop and exploit the nation's mineral deposits and to market the resultant products in Canadian and world markets. The harmonious blending of these roles has made Canada one of the world's foremost producers and exporters of mineral products. A reappraisal of national objectives reaffirms the continuing important position of the Canadian mineral industry in the attainment of economic growth, expanded export markets and regional development. The tax incentives which have, in the past, recognized both the importance of minerals to the national economy and the unique aspect of risk in mineral exploration and development will be continued, albeit in a somewhat modified form.

The future will call for an even greater interplay between government and industry in the solution of greater and more complex problems than have confronted the nation and the industry in the past — trade problems such as tariffs, quotas, and non-tariff barriers; the level and form of taxes; the location of processing facilities and degree of processing; the environmental effects of mineral operations; the supply of trained manpower, problems arising from both the growth and the decline of mineral producing areas; productivity and changing technology; transportation; foreign ownership and control, etc. Solutions to these and other problems must be in harmony not only with national, economic and social aspirations but also with external conditions and influences. On the assumption that the nation will devise generally enlightened solutions or, at least, sensible compromises to the problems of the future, the value of the Canadian mineral industry will probably rise to $12 billion in 1980 and about $17.5 billion in 1985.

RÉSUMÉ

Au cours des 20 dernières années, la valeur de la production minérale est passée de 5.8 p. 100 à 7.1 p. 100 du produit national brut et atteint actuellement près de 5 milliards de dollars par année dont 50 p. 100 proviennent du secteur des métaux, 29 p. 100 du secteur des combustibles et 21 p. 100 de celui des minéraux industriels. Les minéraux et produits dérivés représentent environ le tiers des exportations totales du pays, 43 p. 100 du trafic-marchandises payant et plus de 12 p. 100 des capitaux investis chaque année. L'exploitation minérale a contribué dans une large mesure au développement de l'immense territoire canadien qui s'étend audelà de la zone peuplée sis au nord de la frontière canado-américaine.

Le rôle du gouvernement du Canada a consisté à créer un climat législatif et fiscal favorable aux investissements canadiens et étrangers et à l'expansion constante et ordonnée de l'industrie minérale. Quant à l'industrie privée canadienne, elle a apporté les connaissances et les capitaux nécessaires à l'exploration, à la mise en valeur et à l'exploitation des gisements minéraux du pays, et à la commercialisation des produits sur les marchés canadiens et mondiaux. L'un et l'autre ont harmonieusement contribué à faire du Canada un des principaux pays producteurs et exportateurs de produits minéraux. Une révaluation des objectifs nationaux démontre une fois de plus l'important rôle de l'industrie minérale canadienne dans l'expansion économique, l'extension des marchés extérieurs et le dévelopement régional. Les stimulants d'ordre fiscal, établis dans le passé en reconnaissance de l'importance de l'industrie minérale pour l'économie nationale et les risques particuliers à l'exploration et à la mise en valeur des minéraux, seront maintenus bien que dans une forme quelque peu modifiée.

L'avenir exigera une collaboration encore plus étroite entre le gouvernement et l'industrie pour la solution de problèmes de plus grande envergure et d'une plus grande complexité que ceux du passé, par exemple, les tarifs douaniers, les contingentements, les barrières non tarifaires; le niveau et la forme des impositions; l'emplacement des installations de traitement et le degré de traitement; les effets des exploitations minières sur le milieu, le recrutement de main-d'oeuvre qualifiée, les problèmes soulevés par l'expansion et le déclin des zones de production minérale; la productivité et les changements technologiques; le transport; la propriété et le contrôle étrangers, etc. La solution de tels problèmes doit être conditionée non seulement par les aspirations économiques et sociales de la nation, mais aussi par les conditions et les influences extérieures. Dans l'hypothèse que l'Etat trouvera des solutions éclairées ou, tout au moins, de judicieux compromis aux problèmes de l'avenir, la valeur de l'industrie minière canadienne atteindra problablement 12 milliards de dollars en 1980 et environ 17.5 milliards en 1985.

PREFACE

This publication is a reprint of a paper presented by the author at the Symposium on Mineral Economics, 57th Annual Meeting of the American Association of Petroleum Geologists in Calgary, Alberta, on June 23, 1970. It is essentially a revision of a paper entitled "Mineral Development Policy" and delivered by the author before the United Nations Conference on the Application of Science and Technology for the Benefit of the Less Developed Countries in Geneva, Switzerland, from February 4-20, 1963 - with some consideration of the future, in view of the theme "The Demanding Decade" of the Calgary conference.

W. Keith Buck
Director,
Mineral Resources Branch.

July 1970

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FACTORS INFLUENCING THE MINERAL ECONOMY OF CANADA - PAST, PRESENT AND FUTURE*

by

W. Keith Buck†

In describing the mineral economy of a country, one has the choice of dwelling on the past, on the present or on the future or, indeed, on some combination of the past, present and future. I have chosen the latter approach, as the future of a democracy such as Canada is dependent on decisions taken in the present, and the present in turn, has its roots in the events of the past. The strength of the democratic system is, indeed, in change through evolution, not change through anarchy - modified, perhaps, by a necessary speeding up of the process of evolution in view of the pace and pressures of modern life.

The Canadian mineral industry is a part of the world mineral industry and its present strength is partly a result of a recognition of this fundamental fact. The saying that "no man is an island unto himself" is nowhere more applicable than when applied to the Canadian mineral industry. Its growth and prosperity has been and is intimately associated with the world market for and competition in minerals. Although our major market is the United States which takes 60 per cent of our mineral exports, we export minerals to more than 80 countries. Our present and future actions must continue to reflect this important fact, if our industry is to continue to grow and prosper.

In the world context in which it exists, Canada is the world's third largest diversified producer of minerals. It is the world's largest producer of nickel and zinc and is among the leading producers of more than a dozen other minerals. Minerals and mineral products account for about one third of the country's total export trade. At the time of Confederation, 100 years ago, minerals accounted for less than 5 per cent of total Canadian exports.

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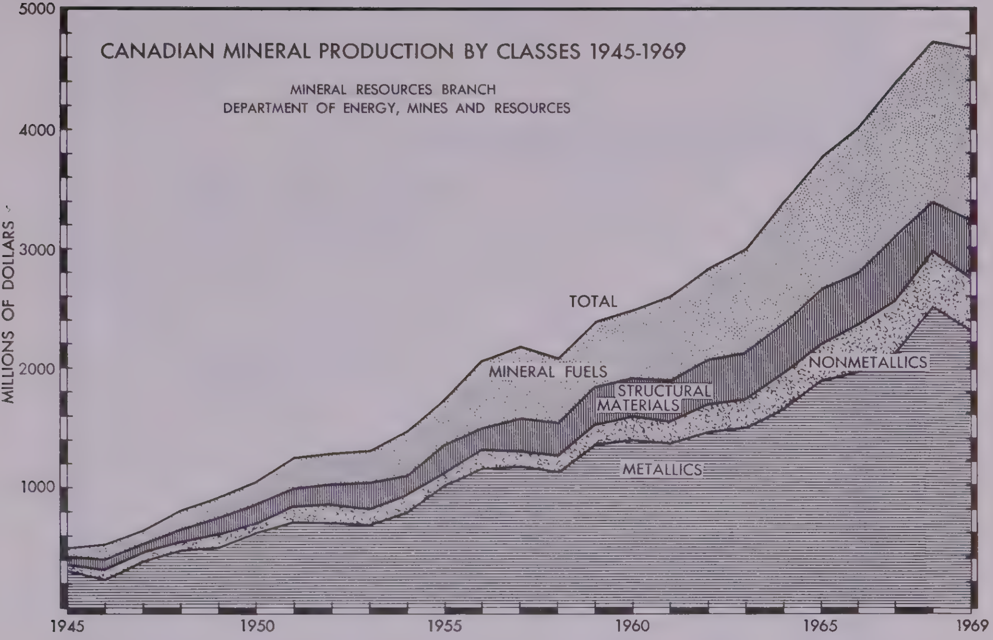
*Paper presented at the Symposium on Mineral Economics, 57th Annual Meeting of The American Association of Petroleum Geologists, Calgary, Alberta, June 23, 1970.

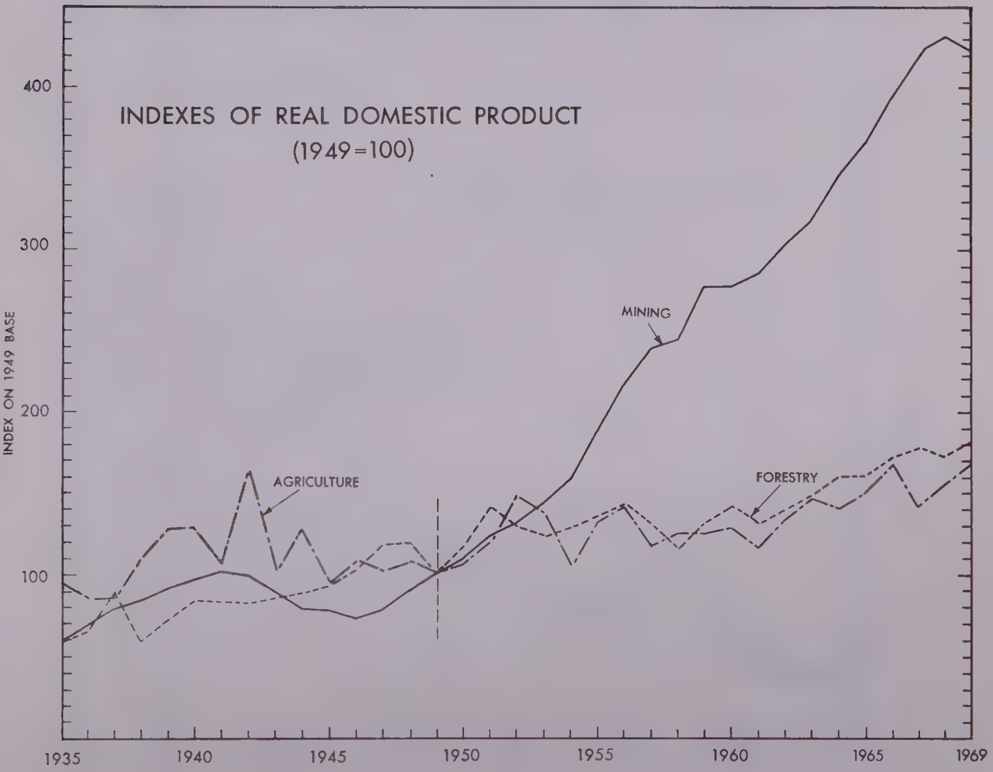
†Director, Mineral Resources Branch, Department of Energy, Mines and Resources, Ottawa, Canada.

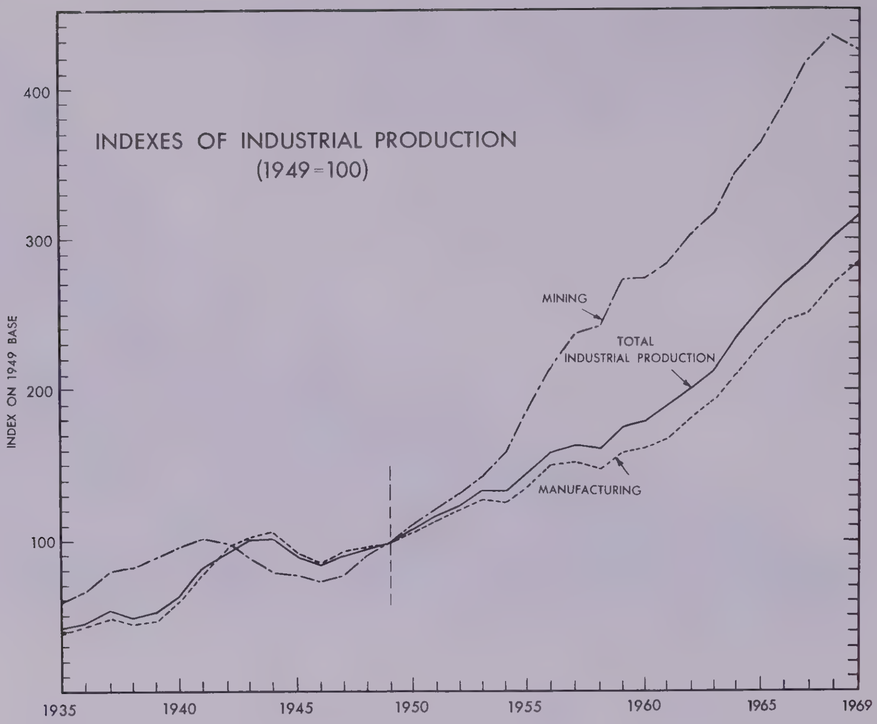
On the domestic scene, the value of mineral production has increased more than sixtyfold during the past century whereas the GNP for the country only increased by a factor of 15 and population increased by a factor of 6. In the total primary resource sector, the net value of mining production amounts to about one third of the total net value; as a proportion of total primary and secondary industry net value, mining and mineral processing amount to over 16 per cent. Since the end of World War II, the annual rate of growth of mining, at 8.5 per cent has been five times that of agriculture, nearly four times that of forestry and nearly double that for the country's total real domestic product.

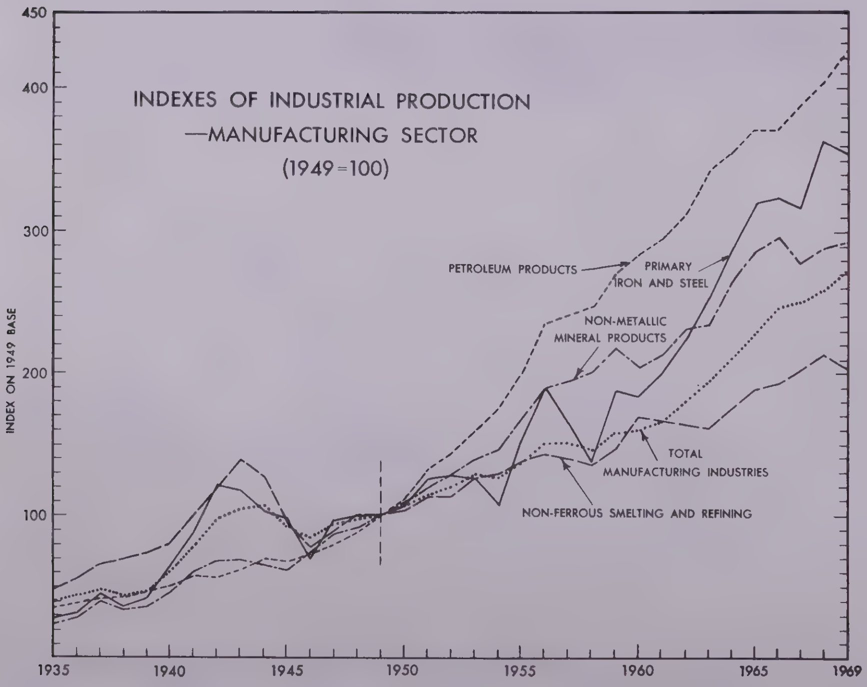
Moreover, minerals account for 43 per cent of all revenue freight traffic and more than 12 per cent of total annual capital investment. The value of mineral production now has an annual figure of nearly $5 billion dollars, of which 50 per cent originates in the metallic sector, 29 per cent in the fuels sector and 21 per cent in the industrial minerals sector of the industry.

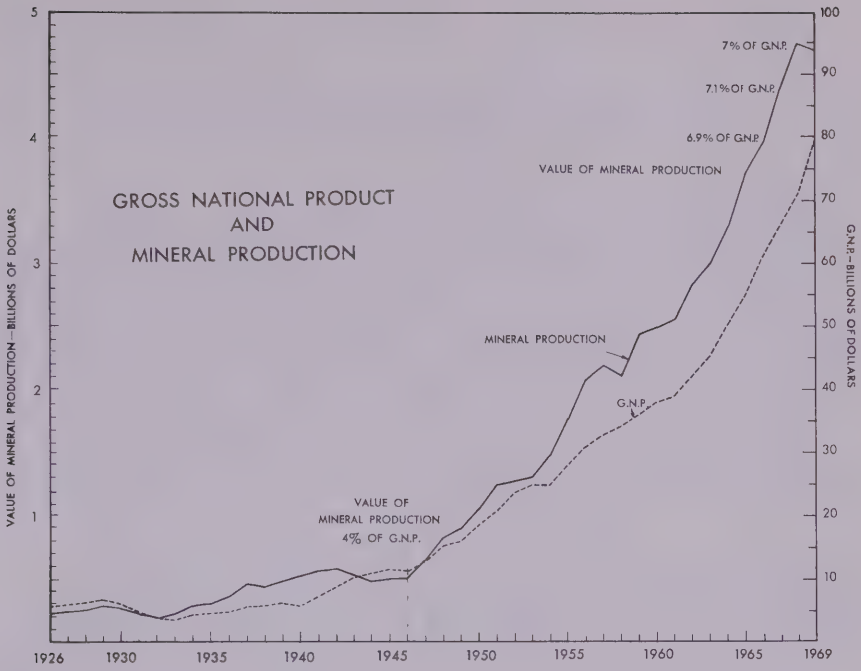
The foregoing indices are merely statistical indications of the role of minerals in the domestic economy. They provide no measure of the role minerals play in the development of the country's infrastructure. In a country with the physical dimensions of Canada, for instance, it is noteworthy that virtually all new railroad development since the end of World War II has been directly related to mineral activity. Much of the new port development and a substantial number of power developments have been brought into being to serve mineral projects. One of the world's largest systems of pipelines has been constructed to serve the oil and gas sectors of the mineral industry. Minerals have, and will continue to have a major role in the opening up of the frontier areas of Canada, both in the provinces and in the northern territories.

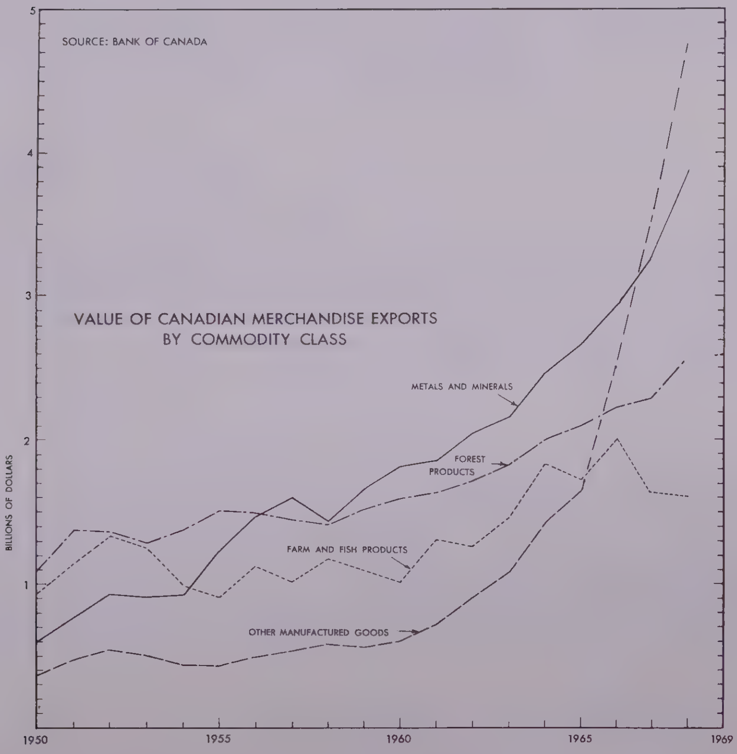

CANADIAN MINERAL PRODUCTION BY CLASSES 1945-1969
MINERAL RESOURCES BRANCH
DEPARTMENT OF ENERGY, MINES AND RESOURCES
MILLIONS OF DOLLARS
5000
4000
3000
2000
1000
TOTAL
MINERAL FUELS
STRUCTURAL MATERIALS
NONMETALLICS
METALLICS
1945
1950
1955
1960
1965
1969


INDEXES OF REAL DOMESTIC PRODUCT
(1949=100)
INDEX ON 1949 BASE
400
300
200
100
MINING
AGRICULTURE
FORESTRY
1935
1940
1945
1950
1955
1960
1965
1969


INDEXES OF INDUSTRIAL PRODUCTION
(1949=100)
INDEX ON 1949 BASE
400
300
200
100
1935
1940
1945
1950
1955
1960
1965
1969
MINING
TOTAL INDUSTRIAL PRODUCTION
MANUFACTURING


INDEXES OF INDUSTRIAL PRODUCTION
—MANUFACTURING SECTOR
(1949=100)
INDEX ON 1949 BASE
450
400
300
200
100
1935
1940
1945
1950
1955
1960
1965
1969
PETROLEUM PRODUCTS
PRIMARY IRON AND STEEL
NON-METALLIC MINERAL PRODUCTS
TOTAL MANUFACTURING INDUSTRIES
NON-FERROUS SMELTING AND REFINING


GROSS NATIONAL PRODUCT
AND
MINERAL PRODUCTION
VALUE OF MINERAL PRODUCTION—BILLIONS OF DOLLARS
G.N.P.—BILLIONS OF DOLLARS
7% OF G.N.P.
7.1% OF G.N.P.
6.9% OF G.N.P.
VALUE OF MINERAL PRODUCTION
MINERAL PRODUCTION
G.N.P.
VALUE OF
MINERAL PRODUCTION
4% OF G.N.P.
1
2
3
4
5
10
20
30
40
50
60
70
80
90
100
1926
1930
1935
1940
1945
1950
1955
1960
1965
1969


SOURCE: BANK OF CANADA
VALUE OF CANADIAN MERCHANDISE EXPORTS
BY COMMODITY CLASS
BILLIONS OF DOLLARS
METALS AND MINERALS
FOREST
PRODUCTS
FARM AND FISH PRODUCTS
OTHER MANUFACTURED GOODS
1
2
3
4
5
1950
1955
1960
1965
1969

Factors Influencing the Mineral Economy of Canada - Past and Present*

What has been responsible for the present important position of the Canadian mineral industry in its national and international settings? In few nations of the world can one identify a precisely articulated mineral policy. This does not mean that the vast majority of nations do not have mineral policies. It is more likely that they, like Canada, have a number of policies: some for the specific sectors of the mineral industry, some for the mineral industry as a whole, and some for the economy in general but with direct impact on minerals. It is the totality of these policies which comprises the mineral policy of Canada, as in other nations, and it is the totality of these policies which shapes the size, structure and character of the mineral economy of Canada.

The role of government, through its mineral policy, has been to provide the legislative and taxation environment necessary to attract capital from domestic and foreign sources, and for the attainment of orderly and continuous mineral industry growth. The role of private industry has been to supply the knowledge and capital to explore, develop and exploit the nation's mineral deposits and to market the resultant products in Canadian and world markets. The harmonious blending of these two roles in Canada has been wonderfully successful, making Canada one of the world's foremost producers and exporters of mineral products.

Land Tenure

What have been, and are presently, the main elements contributing to the mineral economy of Canada? Certainly, security of land tenure has been a cornerstone of Canadian mineral policy. It is fundamental to the encouragement of mineral exploration and development and to the attraction of private capital. Without security of land tenure, other inducements or incentives are of little avail.

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*"*Mineral Development Policy*", by W. Keith Buck; Mineral Information Bulletin MR 64, 1963, Mineral Resources Branch, Department of Energy, Mines and Resources, Ottawa.
"*The Influence of the Mineral Industry in the National Economy*", by J.-P. Drolet and R.B. Toombs; Royal Society of Canada, Special Publications, No. 11, The Earth Sciences in Canada, a Centennial Appraisal and Forecast, 1968.

Under the federal system of government enjoyed by Canada, all mineral rights, with the exception of those in the federally administered Yukon and Northwest Territories, Indian Reservations, National Parks, offshore lands, and certain miscellaneous lands, are vested in the various provinces of Canada. All provinces have their own mining Acts and other pertinent legislation through which they administer and regulate the mineral industry within their boundaries. Mineral exploration, development and production in the Yukon and Northwest Territories, on Indian Reservations and in National Parks are under the jurisdiction of the federal Department of Indian Affairs and Northern Development. Mineral rights offshore from Canada's west and east seacoasts, as well as certain federal lands in the provinces are under the jurisdiction of the federal Department of Energy, Mines and Resources.

Tax Incentives

Another cornerstone of the mineral economy of Canada has been the provision of tax incentives for mineral exploration, development and production. It is these incentives, at the federal level, which have largely been responsible for the dynamic growth of the Canadian mineral industry during the past quarter of a century. Federal corporate income tax legislation has provided substantial direct encouragement to the Canadian mineral industry - a three year, tax-exempt period for new mines; income tax allowances for pre-production costs; generous depletion and depreciation allowances; freedom from capital gains tax; and special excise tax and customs tariff provisions.

These incentives have been augmented at various times, to provide special incentives where it was felt special inducements would encourage desired development. I refer, for example, to the deep-test oil well legislation in effect during a 15 year period, to the extension of federal income tax legislation to encourage the exploitation of potash in Saskatchewan and bituminous sands in Alberta, to the provision of incentives for further processing and product research, and to the creation of exploration incentives in the two northern territories.

Government Services

Possibly the third most important cornerstone of the mineral economy of Canada has been the whole "package" of policies and programs related to government services and infrastructure. Indeed, an important adjunct to the provision of financial incentives in Canada has been the provision of government services. The federal government provides the basic geodetic, topographic and hydrographic maps and the aerial photographs required for mineral exploration and development. The federal government and certain of the provincial governments have well organized geological survey establishments and provide basic geological maps for the exploration and prospecting carried out by private industry. I am proud, indeed, to be associated with a Department which has amongst its branches the Geological Survey of Canada whose 130 years of effort devoted to the mapping and interpreting of the geology of the country has made such an important contribution to Canadian mineral development.

The federal government and some of the provincial governments provide such specific services as free mineral analyses to prospectors, grubstake or prospectors' assistance programs, training courses for prospectors, and ore dressing research. In the field of ore dressing, the federal Mines Branch which operates the largest mining, milling and metallurgical research complex in the country, has made important contributions to the mineral industry over its 63 year history, in the development of processes for the economic extraction of valuable minerals from ore deposits. In recent years, a number of provincial laboratories have begun to assist industry with its ore dressing problems.

A third federal unit which provides services to the mineral industry is the Mineral Resources Branch which, among other activities, carries out resource-economic studies and analyses for use by industry, federal government departments and agencies and provincial governments. For example, the Mineral Resources Branch, in the field of the mineral fuels, has just completed, with the full assistance of industry, an up-dating of the Canadian uranium reserves position and, in collaboration with its sister Branch, the Geological Survey of Canada, has recently made an estimate of measured and indicated coal reserves in western Canada. It is heavily engaged in such current mineral fuel matters as the government's uranium stockpile program and the government's new policy on foreign ownership of uranium.

Infrastructure

Fundamental as the foregoing services are to the mineral industry, the provision of essential infrastructure by both federal and provincial governments is more visible. The federal government has historically provided financial assistance for the construction of roads, railroads, airstrips, power facilities, docks, harbours and housing in connection with mineral resources, under certain specific conditions. Major examples are the Mine Access Roads Program which extended over a 30-year period; the $150 million, federal-provincial cost-shared Roads to Resources Program; the Pine Point Railway; the Northern Development Roads Program, and numerous individual airstrips, power projects, docks, harbours, and housing projects associated with mineral projects. The provinces are also active in the provision of one or more of the foregoing forms of infrastructure, particularly mining roads and power projects. The railway line constructed to serve the coal developments in northern Alberta provides a good example of provincial financial assistance to the creation of essential infrastructure.

Subsidies

At various times and for various reasons there have been a number of less important, although not necessarily inexpensive, elements of Canadian mineral policy. Some of these elements have endured for considerable periods of time. In two major instances - gold and coal - subsidies have been employed to support uneconomic mining operations and to ease the social disruption in dependent communities caused by the decline of these two industries. The problems of the gold mining industry have resulted from a fixed price for gold, rising costs and declining ore reserves. The industry and its dependent communities have been supported through the Emergency Gold Mining Assistance Act for an entire generation (22 years) at a subsidy cost of about $275 million. Because of the increasingly precipitous nature of the decline of the industry and the perilous condition of some of the dependent communities, despite the massive level of annual financial assistance, a study of the gold mining industry and the dependent communities is now under way to assist the government in making a decision on policy when the present three-year extension of the Act terminates at the end of this year.

The Canadian coal industry was supported for two generations (42 years) by subsidies in the order of $320 million. The difficulties of the industry resulted primarily from high mining and transportation costs and competition from competing foreign coal, foreign and domestic oil and domestic natural gas. Federal financial assistance was provided by a number of means: direct subventions under the Dominion Coal Board Act, indirect subsidies under the Atlantic Provinces Power Development Act, and loans under the Coal Production Assistance Act. The coal industry provides a good example of a major change in policy - in the east, the abandonment of a policy of subsidization and the adoption of a policy of rationalization of the coal mining industry and the development of new forms of economic endeavour through the formation of a federal Crown corporation on Cape Breton Island, Nova Scotia and a provincial Crown corporation in New Brunswick and, in the west, by the development of a dramatically large, completely commercial export business with Japan. All in all, Canadian experience with mineral subsidies has not been heartening. Subsidies tend to be self-perpetuating. If they have any value it is that they alleviate immediate distress; all too often however, they tend to postpone, if not prevent, necessary change, rather than facilitating adjustment to change through the adoption of more positive remedial measures.

Bounties

Bounties have been one of the techniques used by both federal and provincial governments for the selective encouragement of the mineral industry. They have occasionally been used in company with, but usually in preference to, national tariffs, to foster the birth and growth of infant industries based on indigenous mineral raw materials. Bounties have been successfully used to encourage the further processing of domestic iron ore into primary iron and steel in both Ontario and British Columbia. British Columbia still maintains a bounty on the production within the province of blister and refined copper from copper concentrates produced within the province. The Canadian Coal Equality Act, in existence for nearly 40 years was an example of federal efforts to encourage the use of domestically-produced coal in the primary iron and steel industry.

The use of bounties, although not very frequently employed, has been moderately successful in Canada, most notably where the general economic conditions surrounding a specific mineral project have been almost, but not quite, favourable. In these circumstances, the provision of a bounty has tipped the scales toward the favourable side. Bounties have had no success where economic conditions were clearly against the project.

Tariffs

Tariffs have also been an element in helping to establish basic primary industries. Although Canadian tariffs on imported crude minerals are either non-existent or minimal, the government has employed tariffs on a moderate scale to promote primary industry and to help it in its formative years. The main use of the tariff in Canada, however, has been to encourage the development of secondary industry. In furthering this objective, the danger exists of creating a shelter for high cost or inefficient industry.

Government Participation in Mining and Oil Enterprises

One of the elements of mineral policy only infrequently used in Canada has been the injection of government into the actual activities of exploring for and producing minerals. At the provincial level, the Province of Saskatchewan through a provincial Crown corporation is successfully engaged in the production and marketing of sodium sulphate. In past years, the Province of Newfoundland was involved in mineral exploration and in the operation of a gypsum mine and plant. The Province of Quebec, through its provincial agency SOQUEM, is engaged in mineral exploration and will soon be involved in actual mineral production activities; it is similarly engaged in petroleum exploration through its provincial Crown agency SOQUIP.

At the federal level, during World War II, the government considered it necessary to operate a small number of Crown corporations to obtain certain strategic mineral supplies. One of these, Wartime Metals Corporation, operated tungsten, molybdenum, chromite and magnesium mines during World War II and disposed of its assets to private industry following the war. Another, Wartime Oils Limited, through loans to private operators, financed the drilling of 23 oil wells in the Turner Valley field of Alberta; 21 of these wells were successful and the project as a whole returned the governments' capital investment. Abasand Oils Limited, also a federal Crown corporation, sponsored exploratory drilling and research into the Athabasca oil sands of Alberta, obtaining results which, a quarter of a century later, proved helpful to industry in bringing into production the area drilled during the early 1940's. Another Crown corporation, now known as Eldorado Nuclear Limited, purchased, in 1944, the radium mine at Port Radium on Great Bear Lake, Northwest Territories, to continue the production of uranium used in the World War II Manhattan Project. Although the uranium ore reserves of this property were exhausted in 1961, Eldorado is still an important entity in the Canadian uranium industry with mines at Beaverlodge, Saskatchewan, a refinery at Port Hope, Ontario and research facilities at Ottawa. More recently, as an instrument of northern mineral policy, the federal government participated with industry in the creation of the joint industry - government company, Panarctic Oils Limited. At the time of Panarctic's creation, two years before the dramatic discovery of oil in Prudhoe Bay off the northern coast of Alaska, it was felt that federal financial support was necessary to encourage exploration drilling in the high Arctic. Now, Panarctic provides a federal government presence in such oil developments as may eventually occur in the Canadian high Arctic. In bringing about a change in Canadian coal policy in eastern Canada, Crown corporations are being used as the principal instrument of coal industry rationalization and as stimulators of alternative economic endeavour - the Cape Breton Development Corporation in Nova Scotia and the provincial Grand Lake Development Corporation in New Brunswick.

Commissions of Enquiry into Broad Regional and National Mineral Problems

One other element of the mineral economy of Canada worthy of mention is the honoured British tradition of Royal Commissions. By this instrument, Canada has examined critically many facets of its national life, including the area of minerals, and from these examinations have come specific policies which have helped shape the form and direction of the Canadian mineral industry. The Canadian coal industry has received more than its share of Royal Commissions and special enquiries, with formal Royal Commissions being appointed by five provincial governments, along with three federal Royal Commissions and numerous special enquiries. It was a Royal Commission which brought into being the coal subsidy program which lasted for two generations and it was a special enquiry which brought about the replacement of the coal subsidy program with a more positive program designed to facilitate change rather than resist the forces of change.

The recommendations of the Ontario Royal Commission on Nickel brought about the refining in Ontario of nickel produced in the Sudbury area. It was a Royal Commission which decided between the two routes recommended, out of seven examined by my Department, for the Pine Point railway. The federal Royal Commission on Energy brought about the creation of the National Energy Board and the National Oil Policy which has been a major factor in Canadian oil and natural gas during the 1960's. It was a federal Royal Commission which brought about the federal White Paper on Tax Reform, of so much concern to industry today. Royal Commissions and Special Enquiries do, indeed, constitute one of the important sources of Canadian mineral policy, particularly in areas of broad regional and national concern.

Other Factors

The foregoing by no means exhausts the factors which have influenced the past development of the Canadian mineral industry. One could comment on, for instance, the influence of decisions or actions taken in specific situations such as those related to the financing of the construction of the Trans-Canada Pipeline system, to the Supreme Court decision on the matter of jurisdiction of mineral rights off the coast of British Columbia, and to the recent court decision on the tax-exemption case involving the MacLean Mining Company, etc. However, any further description of individual decisions or actions only serves to emphasize the diverse means by which a modern, complex society such as Canada has developed its mineral policy.

Factors Influencing the Mineral Economy of Canada - Future

Up to this point, I have dealt with the industry of the past and present and those elements of the mineral economy of Canada which have helped shape the Canadian mineral industry as we now know it. But what of the future? Unquestionably, it will be shaped by present and future decisions on the part of our selected representatives on the specific problems of the moment. Some decisions will be for the short term, others for the long term. In all decisions to be made, economics will not be the only decision-making factor. In a democracy such as ours, a number of factors influence governmental policy decisions - economic factors, yes, but also social, political and other factors. It would be impossible for any one person or any group of persons to foresee all the matters of future concern to the Canadian people and their governments. However, there are even now a number of obvious areas of concern in which policies are being considered or developed and which will, in their totality, shape the future mineral economy of Canada. These are generally known to you but, in the context of the theme of this afternoon's session, it would be useful for me to touch on them, if only briefly.

Taxation

One area of obvious importance and concern is that of taxation. Following the publication of the report of the Royal Commission on Taxation (the Carter Report), the government received numerous representations from the mineral industry, many of which were critical but few of which offered alternatives. Subsequently, the government issued a White Paper on Tax Reform, now the subject of Committee hearings in both the Senate and House of Commons and of further industry representations. Substantial changes were proposed in the White Paper; it provides continued incentives to mineral exploration and development but at lower levels and in different forms than the industry presently enjoys. In the fullness of time, there will be a draft bill, discussion of the draft bill and, finally, a revised federal tax structure. In an industry which owes much of its present size and shape to the present tax incentives under the Income Tax Act, the form and shape of the tax structure of the future is all important, indeed, vital. The challenge will be to achieve essential reform to make the impact of taxation more equitable and at the same time to retain a strong, viable economy. In the mineral industry, its very future depends on the compromises reached in the successful attainment of these two objectives. In the absence of a knowledge of a future policy in this one area, it is impossible to predict the future size and structure of the Canadian mineral industry.

Further Processing

One of the continuing elements of the mineral economy of Canada relates to further processing. It derives from a desire in Canada, a desire shared by most nations of the world including the most highly industrialized nations, to process its mineral production to the most highly manufactured form possible, prior to export. The recommendations of the 1917 Ontario Royal Commission on Nickel were an early articulation of this desire. It has been more recently articulated in Ontario, through its new provisions for further processing in Canada, and in British Columbia by its new regulations governing further processing - the latter arising directly out of an immediate desire for a degree of copper processing in the province. Direct financial assistance can be helpful in achieving further processing; for example, a substantial regional development grant, which the federal government provided, facilitated the construction, now under way, of Ontario's first zinc smelter at Timmins, Ontario.

It is not generally realized the extent to which minerals are already processed in Canada. Over 80 per cent of the Canadian copper production is processed within the country; 98 per cent of nickel production goes through a semi-processed stage and 55 per cent is refined; over 60 per cent of the lead output and 40 per cent of the zinc output is processed in the country. Although only 18 per cent of Canadian iron ore production is processed in Canada beyond the concentrate or pellet stage, this must be related to the fact that there is relatively little international trade in further processed forms such as pig iron or steel ingots.

Of course, the whole question of further processing has two sides to it. Canada has developed a major aluminum smelting and refining industry on the basis of imported bauxite; its phosphate fertilizer industry is dependent on phosphate imported from the United States; its steel industry, among the first twelve in the world, is largely dependent on the importation of coking coal from the United States; and it imports a number of essential steel alloying raw materials due to an absence of economic resources of such minerals in Canada.

Factors mitigating against further processing before export are the high tariffs maintained by other countries on further processed minerals. The Kennedy Round of GATT negotiations was designed to reduce tariffs on semi-processed metals thereby encouraging a greater degree of pre-export processing in Canada. In contrast to the encouragement for further domestic processing by the Kennedy Round of GATT negotiations and by recent provincial legislation, one important incentive to further processing may be removed by the White Paper on Tax Reform in that it does not provide for depletion allowance through to the refined stage of processing as is now provided under the present Income Tax Act. Be that as it may, there is a deep and continuing desire on the part of Canadians to process domestically-produced mineral materials to the highest degree possible, a desire tempered by the realities of the international market place. Doubtless, future mineral policy will take cognizance of both the desire and the realities.

Foreign Ownership

No discussion of the future mineral economy of Canada would be complete without reference to the subject of foreign ownership, on which subject the government has recently made known its views insofar as uranium is concerned. The basic facts are well known. Within the mineral industry the proportion of firms in which foreigners own a majority of the voting shares is, for metal mining, more than 60 per cent; in smelting and refining about 85 per cent; in the oil and gas well industry over 80 per cent; and virtually all the petroleum refining industry - a situation shared by few nations of the world. A number of studies have demonstrated that, whatever the criteria, foreign-owned companies perform little differently from domestically-owned companies. The advantages that foreign investment have brought are also well known - necessary investment capital, particularly risk capital; assured markets; management know-how, and sometimes new technology - but concern and public debate continues, in view of the pervasive nature of the problem and the vulnerability of Canadian firms to foreign take-over. It was the planned take-over of Denison Mines Limited by Hudson Bay Oil and Gas which prompted the government to articulate its views on the matter of uranium through the March 2, 1970 announcement of the Prime Minister and the March 19 and May 15 announcements of the Minister of Energy, Mines and Resources, The Honourable J.J. Greene. Industry was invited and has acted on the invitation to make its views known to facilitate the drafting of the regulations which will govern foreign ownership in the uranium sector. Mr. Greene has stressed that the regulations will attempt to accomplish two main objectives - the implementation of the government's new policy on foreign ownership of uranium and the equitable treatment of those companies operating or exploring in Canada under the previous rules of the game. Companies not now engaged in mining operations will have six years to demonstrate that they have an economically viable uranium ore deposit before they become subject to the new rules imposing a maximum total foreign ownership of 33 per cent and a maximum individual foreign ownership of 10 per cent. Coincident with the government's announcement of its new policy on uranium, the Prime Minister has announced that the government is presently studying the whole question of foreign ownership in Canada. It is obvious, therefore, that policy decisions on foreign ownership will be one of the elements in Canada's future mineral policy, influencing not only the form of mineral policy in its totality but influencing also the size and structure of the mineral industry itself. The industry is already commencing to adjust to the new policy on foreign ownership in uranium.

Trade

With 60 per cent of Canadian mineral production exported and with one third of Canada's total exports of all kinds consisting of minerals and mineral products, it is obvious that trade policy in such matters as tariffs, quotas, non-tariff barriers, etc. is vital not only to the Canadian mineral industry but also to the Canadian economy in general. The Kennedy Round of GATT negotiations concluded in mid-1967 provided for a number of things including tariff reductions covering a wide range of industrial and manufactured goods in the non-trading nations, in many cases to be phased over a period of four years from January 1968. For minerals, tariff cuts vary from 20 to 50 per cent in a large number of products exported by Canada. As a result of the negotiations, Canada received more favourable access for its more fully processed minerals in the markets of a number of its trading partners. Although world tariffs are still high in a number of areas beyond the crude minerals stage and although there still remains a number of non-tariff barriers to trade, it can nevertheless be accepted that a new era of foreign trade is opening up, providing many opportunities for trade expansion. Increased liberalization of trade makes it more essential than ever that the Canadian mineral industry remains competitive and that it pursues new marketing opportunities aggressively, particularly in the field of more highly processed mineral products. With 60 per cent of our mineral exports destined for United States markets, 21 per cent to Britain and western Europe, and 8 per cent to Japan, we must attempt to diversify our markets in relative terms, at the same time retaining individual markets in absolute terms. Although our trade relations with all our trading partners are important, our trading relations with the

United States, our largest market, are vital. It is in this area that mineral policy decisions are particularly critical, as is evident by the current dialogue between our two countries on trade in the mineral fuels - petroleum, natural gas, uranium and coal. In the first two, oil and gas, the United States constitutes our major market; in uranium, what is, in effect, an embargo prevents commercial Canadian sales in the United States; in coal, we provide a major market for United States coal exports.

Productivity and Technology

One of the surest means of maintaining our competitive position in international trade is through increasing productivity - through the improved performance of the three traditional factors of production - land or mineral resources, labour, capital - to which must be added a fourth factor, technology. Productivity in the mineral industry has been generally increasing at a higher rate than for the economy as a whole but even here it has commenced to slacken. The average annual rate of increase in output per worker in mining during recent years has been only about one third the average increase during the entire 1950 to middle 1960's. The average increases in wages and salaries have for some time now exceeded the long run average rate of growth of productivity. This suggests the need for greater attention to technological research and the more efficient employment of labour and capital at all stages from exploration to marketing.

Manpower

There are two aspects of manpower which have been symptomatic of the mineral industry but which are diametrically opposed. The first relates to the difficulty which the industry has had in attracting and retaining essential manpower, whether it be professional, skilled or unskilled. The other relates to the high level of immobility of the work force in many old and dying mining communities suffering from a decline in ore reserves. Policies and programs must be developed which will provide solutions to both these problems. In some cases, improved co-ordination in the implementation of existing programs may provide a solution, at least in part. Mining communities are frequently remote; for this reason they must be made attractive both in physical and cultural terms in order to draw and retain essential manpower. Provisions must be made for the work force to touch base with urbanized living at regular intervals and to benefit from such essential facilities as good schooling, medical and dental services. These are as much a cost of mineral extraction as are the very extractive processes themselves. A special effort must be made to attract and retain professional staff by providing professional challenge and professional rewards. Increasingly, an effort must be made to cultivate technological and management excellence at extractive operations. Far too infrequently in the past have opportunities been provided for professional staff to regularly and systematically undertake further education and retraining in their professions. Such a program on an industry-wide basis would, I feel certain, pay immense dividends in productivity improvements. Moreover, it would advertise to bright, intelligent young people that there was, indeed, a challenging professional career in the mineral industry.

At the opposite extreme, there must be developed a greater awareness that mineral deposits, by the very nature of their occurrence, do become exhausted in either physical or economic terms and that the facilities and communities, which have come into existence because of them, no longer have any purpose. All too often community pressures develop to keep a sub-marginal mine in operation - at great cost to the nation. This results in an inefficient use of labour and of capital, and a decline in the overall productiveness and efficiency of the industry. Instead, there is a need for policies to ease the severe dislocations resulting from mine closures and speed up the adjustment to change. Increasingly, with the growing age of Canadian mining camps and the inevitable closure of mines from declining ore reserves, industry and government will be called on to devise enlightened, workable solutions.

Transportation

In a country with the physical dimensions of Canada, we cannot comment on the future mineral economy of the nation without reference to the transportation factor. Just as transportation infrastructure, whether created by the public sector or the private sector, has played an exceedingly important role in the past development of the Canadian mineral industry, it will continue to play an exceedingly important role in the future development of the industry. As minerals in Canada are particularly dependent on efficient and economic rail, road, pipeline, water and air transportation media and related terminal facilities, public policies in the field of transportation will continue to play a major role in shaping the size, structure and location of future mineral enterprises in the country.

Environment

The Canadian mineral economy of the future, as with that of most of the more highly developed countries of the world, will increasingly be influenced by a general concern for the quality of the environment in which we live. This concern for environmental quality will become increasingly a factor in the economics of mineral development and, hence, in the corporate decision-making process. Indeed, it has become a widely accepted ethic that the environmental costs encountered in the mineral industry must henceforth become just another operating cost. In the public sector, concern for environmental quality will become, increasingly, a factor in government legislation and regulation. Governments have a responsibility to identify the nature and extent of the "environmental problem" and to establish and implement environmental standards. To this end, there is a greater need for what might be termed "environmental planning" whereby government and industry jointly conceive realistic but effective environmental programs which reflect the ecosystem, the social system, and the national and international economic system, to achieve national goals for environmental quality which are compatible with national economic and social goals.

There is already new legislation and regulations on the environmental aspects of mineral activity, in some of the provinces. So also is there new federal legislation affecting the two northern territories administered by the Department of Indian Affairs and Northern Development - the Oil and Gas Conservation and Production Act passed by Parliament last year; the Northern Inland Waters Bill, soon expected to become law, which has the goal of maintaining the purity of our northern waters and ensuring an equitable distribution of water resources; the Arctic Waters Pollution Prevention Bill, which is also expected to become law shortly, and which is designed to protect the marine and shoreline environment in the Arctic; and new Land Use Regulations which are now in preparation to follow suitable amendments to the Territorial Lands Act. Mention must also be made of the new Canada Water Act, the administration of which will be the responsibility of the Department of Energy, Mines and Resources when it is enacted.

CONCLUDING REMARKS

From all the foregoing, I think it is axiomatic that the future will call for an even greater interplay between government and industry in the solution of greater and more complex problems than have confronted the nation and the industry in the past - tax measures; the location of processing facilities and degree of further processing; foreign ownership; trade problems such as tariffs, quotas, and non-tariff barriers; productivity and changing technology; the supply of trained manpower; declining mining communities; transportation; and quality of the environment. Solutions to these and other problems must be in harmony not only with national, economic and social aspirations but also with external conditions and influences. On the assumption that the nation will devise generally enlightened solutions or, at least, sensible compromises to the problems of the future, the value of the Canadian mineral industry could be expected to rise to $12 billion in 1980 and $17.5 billion in 1985.

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